PATENT SPECIFICATION

357,257

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COMPLETE SPECIFICATION

Improvements in or relating to Reflectors for Lighting and Heating.

We, GUY CAMPBELL, a British subject, HAYDN THIES HARRISON, a British subject, and THE BENJAMIN ELECTRIC LIMITED, a British Company, all of Brantwood Works, Tariff Road, Tottenham, London, N. 17, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in reflectors for lighting and heating, the object being to provide an improved specular surface which will not deteriorate through exposure to the atmosphere or to heat.

Our improved reflecting surface may be made in any desired hue or colour by which the spectral character of the light source may be modified such as, for example, to provide a monochromatic light covering a narrow wave length band of the spectrum. Other features and objects of our invention will hereinafter be referred to.

According to this invention in the method of providing a reflector body with a specular surface which comprises applying a metal or alloy in powdered or other form to a fusible surface of said body and firing the same thereon, the fusible surface is of a neutral colour (e.g. white) or has a hue similar to or the same as that of the metal applied. For example, a metal base may first be coated with a ground coating of vitreous enamel of a suitable glass-forming composition with a coefficient of expansion approximating to that of the base and the final metal coating. This primary coating serves to form a smooth even surface on the base to receive the final metal coating forming the actual reflecting surface.

The final metal coating may be applied over the primary coating on the reflector body as in ordinary vitreous enamelling by being ground up with a suitable flux or vehicle with which the reflector body is coated and fired in a muffle. After firing the flux or vehicle will form a transparent protective glaze over the metal coating and the reflecting surface thus formed, whilst having the specular characteristics of polished metal or silvered glass, is untarnishable and unaffected by heat. Any other known methods of fusing on the final coating metal may be employed such as the use of a spray gun in which the coating metal and vehicle are heated to their fusing point and sprayed on the reflector body, or the metal may be applied as a foil and burnt on to the body, or dusted on as a powder and fired in a muffle to fuse it into a continuous coating.

As hereinbefore mentioned, by suitable selection of the metal used to form the reflecting surface the character of the luminous flux from the light source or heating element may be modified. It is well known to those skilled in the art that visual acuity in certain circumstances is most pronounced with amber coloured illumination. Accordingly, a further feature of our invention consists in utilising a metal or alloy for forming our improved reflecting surface by which the radiant energy from a light source such as an electric incandescent lamp may be modified by absorbing the short wave length end of the spectrum. A suitable metal for this purpose is gold, which may be used in a pure state or alloyed with silver to lighten its colour slightly, so that it will reflect and transmit approximately the middle portion of the spectrum consisting of a wave length band of between 550 and 700 ($\mu\mu$).

The resultant illumination is a bright warm amber colour which is more restful to the eyes owing to the elimination of the two extremes of the spectrum.

As an example of the manner in which the invention is carried into effect, we may refer to the production of a specular gold surface. In this case the reflector body is first provided with a primary coating of vitreous enamel in customary fashion, such coating being then thoroughly cleaned with a wash leather. The gold in finely powdered form and suspended in oil of lavender is then applied by a soft camel-hair brush. If practicable it is convenient to spin the reflector in a lathe while applying the metal in order to produce a thin uniform

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layer. The thinner the coating the better is the final specular surface.

The metal coating is now allowed to dry, e.g. in a room heated to 110—120° F., and the reflector is subsequently passed to a muffle furnace for firing. It should not be raised immediately to the maximum firing temperature as a little time is required to drive off the organic medium in the coating. The muffle should have a good draught to take away combustion products. Finally, firing takes place by leaving the reflector in the muffle for two or three minutes at a maximum temperature of about 700° C.

For metals other than gold the firing times and temperatures will, of course, vary somewhat.

For use in illumination work where a white light is required, such as flood-lighting, the metal employed in the final coating forming the reflecting surface may be silver or platinum. Such a reflector will be more efficient than the usual glass mirror reflector employed for this purpose as there will be comparatively no loss of light through absorption as occurs in such known mirror reflectors owing to the light having to pass twice through the thick glass before reaching the object to be illuminated.

In order to improve the richness and density of the final reflecting surface formed by the deposited metal we may add a pigment to the composition, forming the primary smoothing coating corresponding in colour hue to the metal selected for the final reflecting surface. Thus for example when it is desired to produce a gold reflector, a suitable yellow pigment may be added to the composition forming the vitreous surface. Similarly when the deposited metal for forming the final reflecting surface is silver a white pigment may be used in the primary smoothing coating.

In some cases the deposited metal may be applied to the reflecting body to a varying density or thickness and by this means certain parts of a reflector may be made more specular than others, and thus cause to improve the directional qualities of the reflector. Thus for example in a skirted dispersive reflector the skirt portion may be made more specular than the remaining parts of the reflector which will thus assist in increasing the more distant areas illuminated from a reflector and consequently result in more even light distribution over the area illuminated as a whole.

In a further modification a reflector may be formed with only a part of its surface made specular by the application of metal. By this means it is possible to construct a vitreous enamel reflector with a reflecting surface having varying or different optical characteristics, that is to say part of the surface will be specular and part diffusing. Such a composite reflector would be of value in illuminating large areas in which it is desired to illuminate some particular portion or portions to a higher intensity than the remainder.

By reason of the specular character of our improved reflecting surface, a continuous surface is liable to produce "striations" in the form of rings or images similar in shape to that of the light source, which in some classes of illumination work is objectionable. This may be avoided by stamping the metal base on which our improved reflecting surface is formed with a multiplicity of plane surfaces such as described in Patent Specification No. 252,880. It will be appreciated that any desired shape of reflector may be formed with such plane surfaces, enabling even illumination to be obtained, which also results in very much less glare than that given by a continuous surface.

It will be appreciated that our improved reflecting surface may be employed with advantage in conjunction with all classes of light sources and heating means, including gas, owing to its durable nature. It will also be understood that we do not wish to limit ourselves to employing any particular metal or alloy for producing our improved reflecting surface. For example, whilst we have described the use of gold, silver and platinum, other metals or alloys of an equivalent colour where suitable may be employed.

For the purpose of modifying the spectral character of light from an ordinary incandescent electric lamp our invention is of particular value, and may be used both as an outside or internal or supplementary reflector for an electric lamp.

By the term "neutral" it is intended to cover any colour that will not adversely change or affect the colour of the final coating. Generally speaking a colourless base will not be suitable when dealing with, for example, black and like metallic reflector bodies, since such a colourless base would not be neutral in the sense in which that term is employed in the present specification. Where the colour of the reflector body is not likely to affect the colour of the final coating, a colourless glaze may be employed, but in other cases white, grey or similar colours may be employed.

Having now particularly described and ascertained the nature of our said inven-

tion and in what manner the same is to be performed, we declare that what we claim is:—

1. The method of providing a reflector body with a specular surface which comprises applying a metal or alloy in powdered or other form to a fusible surface of said body and firing the same thereon, wherein the fusible surface is of a neutral colour (e.g. white) or has a hue similar to or the same as that of the metal applied.

2. The method claimed in claim 1, wherein the reflector body is of metal with a vitreous coating.

3. A method as claimed in claim 1 or 2 in which the deposited metal is applied to the fusible surface to a varying density or thickness according to the directional or other qualities of the finished reflector desired.

4. A method as claimed in claim 1 or 3, in which the reflector body is formed with a reflecting surface having varying or different optical characteristics so as to be in part specular and part diffusing.

5. A method as claimed in any of the preceding claims in which the metal or alloy to be applied to the reflector body is selected according to the particular colour wave length required.

6. In the method claimed in any of the preceding claims, the use of one or more precious metals alone or in the form of an alloy.

7. A method as claimed in any of the preceding claims, characterised by the reflector body being formed with a multiplicity of plane surfaces substantially as described.

8. Reflectors made by the processes hereinbefore described and claimed.

Dated this 1st day of December, 1930.
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